

REMARKS

Original claims 1-67 remain pending. New claims 68-74 have been added. Basis for the language found in new claims 68-74 may be found in the specification at, for example, page 5, lines 25-27. Other claims have been amended for clarity and consistency. Applicant notes with appreciation the Examiner's indication that dependent claims 4-8, 21-25, 33,35, 37-41, 45, 50, 54-58, 62, and 65-67 contain allowable subject matter. Applicant requests reconsideration with respect to rejected claims 52-53 and 59. Claim 52 contains language reciting that the ion beam masking member comprises a fiber, which limitation the Examiner concluded, with respect to claims 4, 21, and 37, recited patentable subject matter. Claim 53 depends from claim 52, and claim 59 depends from claim 57 which the Examiner indicated contained allowable subject matter.

In light of the Examiner's indication of allowable subject matter, applicant has re-written claims 4, 21, 37, and 52 in independent form, including all of the limitations of the base claim and any intervening claims. Accordingly, applicant submits that at least claims 4-8, 21-25, 37-41, and 52-59 should now be in condition for allowance.

Applicant's invention relates to a method and system for the preparation of specimens for analysis by electron microscopy using at least one ion beam to mill the specimen. In one embodiment, a system and process are provided for the preparation of specimens for analysis by transmission electron microscopy including a specimen processing chamber, at least one ion beam milling gun, and a specimen support or holder. An ion beam masking member is secured to a surface of the specimen and the specimen is milled. As the specimen is milled, there is no relative movement between the specimen and masking member. This avoids the needs to stop the milling operation and accurately re-position the masking member as is required by some prior art systems. Other embodiments are also described and claimed.

In the Office Action, the Examiner rejected claims 1-3, 9-20, 26-32, 36, 42-44, 46-49, 51-53, 59-61, and 63-64 under 35 USC§103 as unpatentable over Grünwald in view of Doong et al. Grünwald, cited in applicant's specification, teaches an ion beam milling system using two ion guns for use in the preparation of samples to be used in both SEM and TEM analysis. The system uses an SEM as a high resolution imaging device to

observe the progress of the ion milling of a sample and to determine when a proper sample thickness has been achieved. Also, as the sample stage can be tilted, the system is also taught to be useful for slope cutting of specimens. Doong teaches a method of forming cross-sectioned electron transparent specimens using a metallic mask deposited on a wafer or chip. Using a reactive ion etch, a portion of the wafer or chip is removed to form a thin viewing surface immediately beneath the masked area.

The Examiner conceded that Grünewald did not teach a masking member secured to a surface such that there is no relative movement between the specimen and masking member during milling. However, the Examiner concluded that such would have been obvious in view of Doong's teaching of depositing a metallic mask to the surface of a specimen. For motivation, the Examiner opined that one skilled in the art would make the modification to Grünewald to add a metallic mask "in order to simplify the milling process and to reduce [the] potential for errors if the mask is not secured to the surface of the specimen." Applicant respectfully disagrees with the Examiner's conclusions and proposed motivation for combining the reference teachings.

Initially, Grünewald, as admitted by the Examiner, uses no mask at all. Further, the ion sources 1 and 2 used by Grünewald are arranged, with respect to specimen 4, such that neither ion source is ever at a 90° angle (i.e., normal) to a major surface of the specimen. See, col. 6, lines 33-43. Grünewald thus thins a portion of the specimen until it becomes electron transparent.

Doong, on the other hand, must deposit a metallic mask over a substrate and then form an "H-shaped" mask, which requires the use of complex focused ion beam, photolithographic, and etching techniques. See, e.g., col. 3, lines 1-4 and 33-37. Doong then uses a combination of reactive ion etching and focused ion beam (FIB) milling *in a direction substantially perpendicular to the* substrate to expose a surface of that substrate.

The two techniques and their geometries are dissimilar. Grünewald does not mill vertically through a sample so that a cross section is exposed. Rather, Grünewald mills to thin a portion of the sample so that it becomes transparent to electrons directed substantially *perpendicular* to the major surface of the sample. Doong mills vertically through a major surface of a sample around an H-shaped mask so that electrons may be

directed substantially *parallel* to the major surface of the sample through cross section 36 as shown in Fig. 3D. Grünewald's milling system and process simply do not need the technique taught by Doong. Nor would application of Doong's technique to the Grünewald system "simplify the milling process." To the contrary, Doong requires several complex and involved operations to deposit a metal layer, and then etch and shape that layer to arrive at the H-shaped mask.

Finally, a specimen prepared with an H-shaped mask per Doong's process would in all probability not be able to be properly milled and thinned using the system of Grünewald because of the different geometry of Grünewald's system. For all of these reasons, applicant submits that the Examiner has failed to establish a *prima facie* case of obviousness. The rejection is not well taken and should be withdrawn.

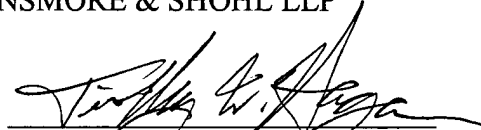
Newly-added claims 68-74 are believed to recite subject matter that is not taught or suggested by the prior art. Claims 68-71 recite preferred embodiments of the invention wherein the ion beam masking member is secured to the specimen using an adhesive or a mechanical attachment. Claims 72-74 recite a preferred embodiment of the combination of the specimen, specimen holder, and fiber ion beam masking member that prevents relative movement between said specimen and ion beam masking member during milling of the specimen. This provides an electron transparent surface for the specimen adjacent the ion beam masking member during milling.

For all of the reasons discussed above, applicant submits that claims 1-74 as amended are patentable over the prior art of record. An early indication of the allowance of all claims is respectfully solicited.

Respectfully submitted,

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